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ABSTRACT

This study proposes to (1) explore the responses of boys and girls at three age levels to several different barrier situations; (2) assess the personality correlates associated with barrier behavior; (3) evaluate covariance differences between the sexes; and (4) determine the relationship between barrier behaviors and sex-role typing. A total of five barrier tests were administered at ages 3.5, 4.5, and 5.5 years. A central measure, the barrier intensity score (BI), was obtained by an observer who rated the intensity of the child's efforts to overcome the barrier. A personality characterization of each child was obtained from sets of teacher ratings. Results show an absence of sex differences in means and sigmas of BI scores; however, reliable differences in the correlational patterns associated with BI as a function of sex suggest that instrumental behavior in response to barriers is moderated by different psychological structures in boys and girls at age 4. These findings imply that analysis of covariance is essential in the evaluation of sex differences in barrier research. (GO)

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Sex-role Typing and Instrumental Behavior: A Developmental Study[1]

by

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Assessments of children's behaviors in the face of barriers provides the opportunity to evaluate, in a naturalistic context, both the affective responses of children to frustration and their coping abilities or problem solving approaches when confronted with an intractable environment. The now-classical experiment by Barker, Dembo and Lewin in 1941 demonstrated that most children evidence regression in level of play constructiveness in the face of a physical barrier separating them from attractive, previously-played-with toys. Individual differences in response to the Barker et al. barrier situation were found by Block and Martin (1955) in a replication study and these differences were related to degree of ego control. The predictive utility of preschool barrier behavior was demonstrated by Pederson and Bell (1970), Halvorsen (1971), and Bell, Weller, and Waldrop (1971) when early barrier reactions were found

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related, five years later, to social competence, imagination, dominance and fearlessness. Together, these findings underscore the potential of barrier situations for contributing to our understandings of the motivational substrata moderating instrumental behavior.

The findings surrounding the question of sex differences in barrier behaviors are somewhat inconsistent and appear to depend heavily upon the particular behaviors indexed. Measures of physical activity expended in trying to overcome barriers generally do not yield sex differences (Pederson and Bell, 1970; Halvorsen, 1971; Bell at al., 1971; Jacklin, Maccoby and Dick, 1973; Van Lieshout, 1975). However, when emotional activity in the face of barriers is assessed, studies of toddlers have shown significant sex differences (Goldberg & Lewis, 1969; Jacklin et al., 1973; Van Lieshout, 1975).

Because most studies of barrier behavior have been conducted with children between 13 months and 3 years of age, the pattern of results concerning sex differences is not surprising. With increasing age, it might be expected that socialization pressures in our society would affect barrier reactions differentially for the sexes. Extrapolating from Heilbrun (1968), Block (1972) and Bem (1973), development of traditional definitions of masculinity and femininity would be expected to enhance goal-oriented instrumental behaviors for males and to discourage or interfere with these same behaviors for females. The relative absence of sex differences in studies of very young children, then, may be an epiphenomenon related to their still

undefined self- and sex-role concepts.

The purposes of the present paper are fourfold: (1) to explore, in the context of a longitudinal study, the responses of boys and girls at three age levels to several different barrier situations, (2) to assess the personality correlates associated with barrier behavior, (3) to evaluate covariance differences between the sexes, if any, in the structures underlying barrier responses, and (4) to determine the relationship between barrier behaviors and sex-role typing.

Method

Subjects

The subjects are drawn from a sample of 160 children participating in an ongoing longitudinal study of ego and cognitive development initiated when the children were enrolled in either one of the two nursery schools comprising the Harold E. Jones Child Study Center at Berkeley (Block & Block, 1971; Block, Block, & Harrington, 1974). The children live in an urban setting and come from heterogeneous backgrounds. The total subject pool includes 97 White children (60.0%), 50 Black children (31.2%), 9 Oriental children (5.6%), and 4 Mexican-American children (2.5%). The mean social class of the sample as reflected by the Warner, Meeker and Eells (1949) index is 2.3, indicating higher-than-average socio-economic and educational levels of the parents.

Barrier behaviors were assessed when the children were appro-

ximately 3.5, 4.5, and 5.5 years old and the numbers of children actually participating in each of the experiments varies somewhat as shown in Table 1. The table also includes the means, standard deviations, and results of t-test comparisons among the several scores.

The Barrier Tasks

At each age level, a battery of tests and experimental tasks was administered to each child that ranged from 29 to 41 different procedures spaced over five to 12 sessions depending upon age level. Barrier tasks were administered in different sessions and 12 different persons were involved in their data collection over the three-year period, thus minimizing systematic experimenter effects.

Two tasks, the Block Tower and Barrier Door, were administered when the children were 3.5; two different tasks at four, the Barrier Block Box and Barrier Drawer, and one task, the Barrier Puzzle, at five. Time does not permit close description of each of the tasks. In the Barrier Door and Drawer situations, the child was asked to help the experimenter either by opening the door or drawer which had been fitted with strain guages in such a way that they would open only 1.5 inches and then would register the strength of the child's exertions in the face of the barriers. The Block Box and Block Puzzle were somewhat similar in that each required the child to place a Barrier Piece--a block or a wooden jigsaw puzzle piece that looked similar to the other blocks or puzzle pieces--either through a hole in the top of the Block Box or in the puzzle space that, in

each case, was imperceptibly smaller than the Barrier Piece. In all tasks the child's efforts to overcome the barrier were observed, time spent in solution attempts recorded, the number of hypotheses generated about the reasons the block would not fit or the door would not open were noted as well as the nature and number of any alternative solutions to the barrier task tried by the subject. Additionally, the experimenter and, in most cases, an observer rated the intensity of the child's efforts to overcome the barrier. It should be noted that each barrier task was terminated in such a way that the child clearly recognized the task was indeed impossible, even for the experimenter. In all cases the experimenter tried the barriers, was unable to effect solution, and substituted materials ("oh, look, no wonder you couldn't do it--the right block fell on the floor--now you can use this one") or suggested an alternative route that would enable the child to bring the task to a successful conclusion.

The Barrier Intensity scores most clearly reflect the vigor and persistence of the child's goal-oriented efforts to overcome the barrier and are, therefore, the scores with which we will be primarily concerned. The intensity scores for each task were composited and include the independent composited intensity ratings, use of the body for leverage, number of discrete efforts to overcome the barrier (pulls, pushes, etc.), and strain guage readings where available. The intercorrelations of the composited Intensity scores are shown in Table 2. At ages

three and four, the Intensity scores on both tasks were standardized and composited to provide an overall index and their intercorrelations are presented in Table 3.

The Personality Data

The California Child Q-set (CCQ), an age-appropriate modification of the California Q-Set (Block, 1961; 1971) was used to develop personality characterizations of each child The CCQ consists of 100 widely ranging, personality-relevant items that were ordered, using the forced-choice method with a prescribed rectangular distribution, by the several nursery school teachers to describe the personality of each child. One set of teachers--either two or three--independently described each child in the nursery school for three year olds and a completely different set of teachers independently described each child one year later. In all, 11 teachers contributed their descriptions of the 3 year olds and 10 different teachers described the four year olds. The teachers were trained in the use of the Q-set and formulated their descriptions after the children had been in school from 5 to 9 months. For each child the two or three independently achieved descriptions completed at three were averaged, yielding a composite personality characterization at age three. The same procedure was followed in obtaining a composited personality characterization at age four based on a different set of teacher descriptions. For the 100 Q-items, the average across time correlations, calculated via the z transformation, based on a sample of 87 children assessed at both age levels is .48, uncorrected for attenuation.

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The CCQ data at age four was factor analyzed, resulting in 19 factors. However, the results were not altogether satisfactory in that several factors were too global or inclusive in content. In order to achieve factors that were conceptually more differentiating, seven of the over-inclusive factors were "refactored." That is, the Q-variables loading highly on a particular global or high-order factor were selected out and were then refactored. This procedure splits up a global factor into several factors useful for a mid-range level of conceptualization. Using this approach, 40 "superitems" were defined which, in some instances represented the factors emerging from the initial factor analysis and, in other instances, represented factors obtained by the "refactoring" method. The factor scoring method derived from the four year old data was then applied to the three year old data, a procedure that prevents unfair maximization of the relationship between data sets found in such methods as canonical correlation. The average cross-time correlation of the corresponding superitems is .48, uncorrected for attenuation. The primary contribution of this series of analyses is the achievement of discriminant validity; 86% of the superitems manifest discriminant validity. The scores on the 40 superitems at age three and the 40 superitems at age four constitute the dependent data in this report.

Results

Sex Differences

The means, standard deviations, and sample sizes at each

age level for the several barrier scores are presented in Table 1. With respect to the intensity of effort to overcome barriers, there are no sex differences even approaching significance at ages three and four although a difference of borderline significance ($p < .10$) exists age age five when boys exhibit somewhat higher intensity scores. Time spent in contact with the barrier at age five is also marginally higher ($p < .10$) for boys. At age three, boys generated significantly more hypotheses about the possible causes of the stuck door ($p < .01$) but this difference was not manifest at ages four or five. At all three age periods, boys suggested more alternative solutions to the barrier problems but this difference was significant only at age four ($p < .05$) and marginally so at age five ($p < .10$). Overall, the results suggest there is little in the way of appreciable or consistent sex difference with respect to means or standard deviations in barrier solutions at the ages studied.

Personality Correlates of Barrier Behavior

To evaluate the personality implications of barrier behavior, the barrier scores were correlated with the 40 CCQ Superitems and the results are presented in Tables 4 and 5. At age three, the Barrier Intensity scores (BI/3) were significantly associated with 8 Superitems for girls and 9 Superitems for boys, as shown in Table 4.

For girls, BI/3 was positively correlated with Attractiveness, Restlessness, and Vitality and was negatively correlated with Inhibition, Interpersonal Reserve, Fantasy Orientation,

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Scapegoated and Victimized, and Inappropriate Affect.

For boys, BI/3 was positively correlated with Interesting, Competitive, Teasing, and negatively correlated with Inhibition, Compliance, Interpersonal Reserve Scapegoated and Victimized, Protective, and Immobilization under Stress.

Although some correspondence between the results for the boys and girl samples at age three exist, the extent of such correspondence tends to be obscured by the convention of reporting only statistically significant results, a practice which applies a dichotomy (significant vs non-significant) to what is a continuum. A better way of evaluating the personological equivalence of barrier intensity in three year old boys and girls is to correlate the vector of 40 correlations generated by the BI/3 scores versus the 40 CCQ Superitems in the boy sample with the corresponding vector of 40 correlations for the girl sample. This correlation, the "intercolumnar correlation" (Spearman, 1927) reflects the extent to which the same pattern of personality-implicative relationships characterizes both sexes. At age three, this intercolumnar correlation is .75, an impressively high figure. Generally, then, whenver a personality variable is related, either positively or negatively, to BI/3 in one sex, a corresponding relationship exists for the other sex.

At age four, in the sample of girls, barrier intensity correlated significantly with only one CCQ Superitem, Teasing, where a negative relationship obtains. For boys, however, significant correlates of BI/4 are more numerous. Positive

correlates include Vitality, Sex-typed, Competitive, and Under-controlled. Negative correlates include Inhibited, Scape-goated and Victimized, Intolerant of Ambiguity, Compliant, and Worried and Anxious. The intercolumnar correlation between the BI/4-Superitem correlation vectors for the boys and for the girls correlated -.49, indicating appreciable oppositeness in the personality implications of barrier intensity behavior for the two sexes at the age of 4.5. When it is further observed that the intercolumnar correlation for the sample of boys across the ages of three and four is .77--indicating a stability or continuity in the personality implications of barrier intensity behavior while the intercolumnar correlation for the sample of girls across the ages of three and four is -.49, it is apparent that the discrepancies noted are largely ascribable to changes over time in the personality implications of barrier intensity behavior within the sample of girls.

We have studied the particular correlations for each age level and each sex in order to identify those variables showing an appreciable and reliable change in their implications over time. The BI/CCQ correlations characterizing boys and girls at age three were compared; similarly the BI/CCQ correlations for boys and for girls at age four were compared, and the BI/CCQ correlations at ages three and four were completed for boys, and separately for girls. The results of these several analyses are summarized in Table 6. Reliable covariance differences between the sexes are found only at age four where eight of the 40 BI/4-

CCQ/4 relationships diverge significancly. Reference to Column 3 indicates the loci of the covariance differences in the BI-CCQ relationships for girls between ages three and four. We see in these data a pattern that warrants presentation and tentative interpretation.

In young boys of the ages studied, active, vigorous attempts to overcome barriers seems to represent a continuing and extending indication of competence, confidence, vitality, and relative freedom from the immobilizing, inhibiting effects of stress. They were expressive, less compliant, and more undercontrolling than their peers showing less instrumental behavior in the barrier tasks. In general, many of the same personality characteristics were descriptive of three year old girls actively coping in the barrier tasks. By the age of four, however, the picture for girls has changed. Girls demonstrating instrumental behavior in the barrier situations at age four are no longer the vital, ebullient, attractive, expressive, active girls seen at age three. Rather, they appear inhibited, less attractive, less vital, less restless, more isolated, and are frequently scapegoated and victimized by their peers.

Reference to the item indexing sex-typing suggests an increasingly positive relationship with barrier intensity for boys, becoming significant by age four. For girls, however, the trend is reversed and there are significant differences in the barrier intensity-sex-typed relationship between boys and girls at four. These results suggest that active coping with barriers is both culturally- and ego-syntonic for boys.

For girls, however, the cultural proscriptions surrounding appropriate feminine behavior as these are communicated in differential socialization emphases come to interfere with problem-oriented, active instrumental behaviors in the face of barriers. We might ask, "What about those vital, energetic, expressive, attractive, restless, interesting girls at three who attempted to cope effectively with the barrier situations? Have they learned--so early and so well--the cultural proscriptions--learned that they should not be too vigorous in the face of physical barriers--learned that they should seek help?" At this point we cannot answer these questions with sufficient confidence; we are, however, continuing to pursue these and related questions in the context of our longitudinal study, indexing other behaviors and evaluating parental socialization practices and teaching strategies associated with differential responses to barriers in boys and girls and over time.

In summary, despite the absence of sex differences in the means and sigmas of the Barrier Intensity scores, we have identified reliable differences in the correlational patterns associated with BI as a function of sex, suggesting that instrumental behavior in response to barriers is moderated by different psychological structures in boys and girls at age four. The methodological implication of these findings warrant emphasis. In evaluating sex differences, comparisons of means and sigmas for the two sexes is simply insufficient; covariance differences must be evaluated as well.

Block, Block, & Harrington

SCRD, April, 1975

Table 1

Standardized Barrier Scores at Ages 3.5, 4.5, and 5.5 for Boys and Girls

	Age 3			Age 4			Age 5		
Barrier Intensity	Mean	Sigma	N	Mean	Sigma	N	Mean	Sigma	N
Boys	49.95	7.84	55	50.15	7.25	64	51.62	9.39	57
Girls	50.20	9.11	61	49.74	8.00	63	48.08	10.35	48
t		.16			.30			1.83	($p < .10$)
Barrier Time									
Boys	50.59	8.38	54	49.32	6.18	62	64.21	9.58	57
Girls	48.65	5.32	61	50.82	9.81	63	49.04	9.04	47
t		.29			.49			1.87	($p < .10$)
Barrier Hypotheses									
Boys	53.17	11.45		49.80	7.62	64	50.97	10.64	
Girls	47.27	7.68		49.79	7.24	63	48.82	9.14	
t		2.95	($p < .01$)		.01			1.12	
Barrier Alternatives									
Boys	51.69	11.68		51.24	7.97	64	51.57	9.80	
Girls	48.54	8.13		48.29	5.72	63	47.89	10.33	
t		1.52			2.40	($p < .02$)		1.87	($p < .10$)

Table 2

Intercorrelations among Barrier Scores at Three Age Levels for Males and Females

	Year 3		Year 4		Year 5
	Barrier Door	Barrier Tower	Barrier Drawer	Barrier Box	Barrier Puzzle
Barrier Door (3)	---	.32**	.31*	.19	.01
Block Tower (3)	.31**	---	.21	-.15	-.03
Barrier Drawer (4)	.21	.07	---	.00	.14
Block Box (4)	.27	.03	.15	---	.09
Barrier Puzzle (5)	.21	.29*	.04	.08	---

The results for Males are above the diagonal; the results for Females are below the diagonal.

* $p < .05$

** $p < .10$

Table 3

Intercorrelations of Summary Scores for Barrier Tasks at Three Age Levels for Males and Females

	$BI/_3$	$BI/_4$	$BI/_5$
$BI/_3$	---	.24	-.03
$BI/_4$	.19	---	.15
$BI/_5$	.27	.05	---

The results for Males are shown above the diagonal; the results for Females below the diagonal.

Table 4. Significant CCQ Superitem Correlates of Barrier Intensity at Ages 3 and 4 for Males and Females

Boys			Girls	
Age 3	Age 4	CCQ Superitem	Age 3	Age 4
-.38***	-.25**	Compliant	-.15	.01
-.22	-.26**	Worried, anxious	-.22*	.10
.25*	.37***	Energetic, vital	.31**	-.13
-.37***	-.43***	Inhibited, constricted	-.33**	.08
-.31**	-.13	Interpersonal reserve	-.27**	.14
-.23*	-.14	Fantasy oriented	-.27**	-.05
.26*	.24*	Physical attractiveness	.35***	-.20
-.33**	-.37***	Scapegoated, victimized	-.28**	.14
.15	.27**	Undercontrolled	.23*	.07
.09	.14	Restless	.36***	-.15
.30**	.13	Interesting	.24*	-.07
.19	.38***	Sex-typed	.21	-.01
-.21	-.37***	Intolerant of ambiguity	-.10	.17
-.27**	.20	Protective of peers	-.08	.02
.29**	.33***	Competitive	.11	-.23*
-.30**	-.17	Immobilized by stress	-.19	.01
.27**	-.02	Teases others	.07	-.26**
-.03	-.14	Inappropriate affect	-.27**	.05
.18	.23*	Curious	.10	-.02
-.26*	.00	Withdraws under stress	-.10	.14
-.26*	-.12	Enjoys solitary activities	-.19	.16
.12	.23*	Autonomy striving	.15	.08

*** = $p < .01$ ** = $p < .05$ * = $p < .10$

Table 5

Significant CCQ Superitem Correlates of Barrier Time, Hypothesis Generation, and Alternative Solution Scores for Boys and Girls at Ages 3 and 4

Correlates of Barrier Time

Age 3

Girls (N = 61)		Boys (N = 54)	
CCQ Superitem	r[a]	CCQ Superitem	r
Worried, anxious	-.31*	None	
Intolerant of ambiguity	-.27*		
Fantasy oriented	-.26*		

Age 4

(N = 63)		(N = 64)	
Manipulative	-.33**	Attractive	.27*
Vitality	-.26*		
Restless	-.27*		
Competitive	-.30*		
Teases	-.27*		

Correlates of Barrier Hypotheses

Age 3

Girls (N = 50)		Boys (N = 43)	
Competitive	.31*	None	

Age 4

(N = 63)		(N = 64)	
Inhibited	.35**	Manipulative	.29*
Resilient	-.27*		
Scapegoated	.27*		
Competitive	-.27*		
Withdraws under stress	.28*		

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Table 5 (continued)

Correlates of Barrier Alternatives

Girls (N = 50)		Boys (N = 43)	
Age 3			
None		Attractive	.33*
		Negative self-evaluation	-.34*
Age 4			
(N = 63)		(N = 64)	
Popular	-.27*	Sex-typed	.28*
Interpersonal reserve	-.27*	Acknowledges negative feelings	-.25*
Imitates those admired	-.25*		
Calm	-.27*		

* $p < .05$

** $p < .01$

SRCD, April, 1975

Table 6

Comparisons of the Differences Between Correlations of Barrier Intensity and CCQ Superitems Scores for Boys and Girls at Ages Four and Five

CCQ Superitem	Probability of Differences between r's[a]			
	Girls vs Boys Age 3	Girls vs Boys Age 4	Age 3 vs 4 Girls	Age 3 vs 4 Boys
Worried, anxious		.05	.08	
Energetic, vital		.006	.02	
Inhibited, constricted		.005	.03	
Interpersonal reserve		.03		
Physical attractiveness		.02	.004	
Scapegoated, victimized		.006	.03	
Restless			.007	
Interesting			.09	
Sex-typed		.03		
Intolerant of ambiguity		.004		
Protective of peers				.02
Competitive			.07	
Teases			.08	
Inappropriate affect			.08	
Enjoys solitary activities			.06	

a. Differences assessed via z transformation

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